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# PROCESS FOR PRODUCING PAPER PRODUCT BY PAPERMAKING TECHNIQUE

**Brief Description of the Drawings:**

Fig. 1 is a whole assembled apparatus.

Figs. 2a, 2b and 2c are a longitudinal section seen from the front, a longitudinal section seen from the side, and a plan view, respectively, of a lid part of a split mold paper machine.

Figs. 3a and 3c are a longitudinal section and a transverse section, respectively, of an outer wall of a split mold part of the split mold paper machine, and Fig. 3b is a plan view of the bottom of the split mold part.

Figs. 4a, 4b and 4c are a longitudinal section, a transverse section and a plan view, respectively, of an inner wall of the split mold part of the split mold paper machine.

**Detailed Description of the Invention:**

Conventional paper containers or boxes have been fabricated by cutting previously produced paperboard, etc. into appropriate size and shape and forming the cut piece(s) into a desired shape on a forming machine. The present invention provides a process for producing a paper product directly from paper stock by a papermaking process.

The above-mentioned conventional method produces a large quantity of waste paper (loss) and involves a considerable number of steps, such as the step of adhering or joining formed parts. Even in large-scale manufacture, the products are still uncompetitive in price. Besides, the conventional method is practically unapplicable to production of paper articles having relatively complicated shapes with many bends. With the improvement of daily life style and the expansion of industries in various fields, the demand for paper articles of complicated

shape has ever been increasing for use as convenient expendable containers or inexpensive rigid packing or wrapping materials. Production of such paper articles has now played an important role as a supplementary division in productive industries. Accordingly, the present invention has an extremely high commercial value.

**Constitution and Effect of the Invention:**

The present invention belongs to the papermaking and processing industries and completely fulfills the above-described demand. It provides a process for producing a paper product of arbitrary shape directly from paper stock comprising beaten pulp or waste paper through a single step or, if necessary, after sizing, addition of fillers, dyeing or refining (the term "paper stock" means a slurry having a prescribed concentration ready to be subjected to papermaking). The paper stock is introduced into a paper machine having a split mold of arbitrary shape and made into a wet preform by forced pressing, which is then dried, finished, and processed into a final product. This process is roughly divided into the following three steps.

(1) The step of preparing paper stock including beating and refining (pretreatment)

(2) The step of injecting the paper stock into a split mold paper machine under pressure and forming a preform (the step of the present invention)

(3) The step of drying, finishing, and processing (post-treatment)

While the step (1) is not so different from that in general papermaking, it is preferred that relatively thick stock A and diluted stock B be prepared and that the former be first supplied into a split mold paper machine and the latter be then injected under pressure. While the concentrations of the stocks A and B vary depending on the type of the desired paper containers, they are usually 15 to 20% and 3 to 5%, respectively. The reason why the stock is divided into two portions is that the low-concentration stock may be deposited on a coarse paper layer once formed of the high-concentration stock to form a paper layer having a uniform thickness in the course of the paper layer formation. The reason why formation of a paper layer is carried out under pressure is that papermaking by merely pouring the stock into a mold is impossible. In addition, pressure application in papermaking is required for the following reasons.

(i) The stock injected into the mold should be treated quickly in order to prevent agglomeration or sedimentation of fibers and to form a uniform paper layer.

(ii) Since a paper container usually has a thick wall, resistance to dewatering increases gradually. Pressure application is effective against the increased resistance to dewatering and to speed up papermaking.

(iii) Pressure application, i.e. forced papermaking, is effective in making the fiber orientation as irregular as possible thereby to enhance the product strength.

As shown in Fig. 1, the apparatus used in the present invention mainly comprises a split mold paper machine 4 and 5 as a main part and, as auxiliary parts, an automatic metering feeder 3, a pressure application unit 7, a beating unit, stock tanks 1 and 2, a drying unit, a processing unit, and the like.

The split mold paper machine is composed of a split mold part (5 and 6 in Fig. 1) and a lid part (Fig. 2). The split mold is composed of an outer wall (Fig. 3) and an inner wall (Fig. 4) which is in contact with the inner side of the outer wall.

As shown in Fig. 2, the lid part 4 has a long cylindrical shape with a hemispherical or conical top. The inside of the lid part forms a buffer chamber 11 having a buffer action on a flow pressure and a flow rate. The lid part has an inlet 13 for injecting stock B at the top thereof and an air outlet 14 adjacent to the inlet 13, the inlet 13 being connected to the metering feeder. The inlet 13 and the outlet 14 are connected to the respective external pipes having the respective valves or cocks. A buffer device 15 for equalizing the flow rate or pressure is provided right below the inlet 13 so as to equalize the flow rate and pressure in liquid.

The buffer device 15 and the shape of the top of the lid part play an important roll in carrying out the present invention. Because the stock fed from the metering feeder is pressurized, the injection pressure gradually increases. As a result, the stock, while being ejected, shows a tendency to form a regular stream. The buffer device serves to make the flow always irregular in accordance with the degree of the above-described tendency. That is, where the injection pressure is high, the flow of the stock rebounds off the buffer device and hits the inner wall of the hemispherical top. The rebound angle decreases (the rebounded flow concentrates on the center of the hemispherical top) in proportion to the pressure, whereby the flow rate or pressure is equalized.

This buffer action works effectively in liquid, wherein the phenomenon of drops' beating which occurs in air is eliminated. Other delicate factors seem to contribute to the buffer action in liquid.

While the buffer device can have various conceivable forms, the simplest and most

effective one is a small tray. The shape and size of the tray, the distance between the tray and the inlet, and the like are decided according to the stock concentration, the size of the inlet, the flow pressure, and so forth. In using other forms, such as a spiral atomizer, too, these conditions should be decided to meet the purpose. Note that a buffer device having too a complicated shape needs precise processing to make, which is disadvantageous.

The buffer chamber 11 has a pipe 8 of a pressure application and dewatering device (including 8 to 10). The pipe 8, one end of which is connected to the pressure application unit 7, pierces the lower part of the buffer chamber, and the other end is vertically inserted into the split mold part. The part of the pipe 8 which is in the cavity of the split mold has several holes, and its bottom end is closed. A stretchable rigid diaphragm 9 is fitted over that part of the pipe and fixed at the lower end of the pipe and near the upper part of the mold. After the stock is made into a paper layer under pressure, a fluid is fed into the pipe 8 to apply inner pressure to press the wet paper layer onto the inner wall of the mold thereby to squeeze out water. A pair of semicircular flaps 18 are provided near the upper end of the diaphragm 9. The flaps 18 move up to shutter the cavity of the split mold while the inner pressure is applied. After completion of dewatering, pressure application is stopped, and the inner pressure is relieved through a three-way cock 10 provided in the pipe 8.

Where it is more advantageous to conduct the inner pressure application and dewatering by means of a unit separate from the lid part, the flaps 18 can be replaced with a tight cap having a pipe piercing therethrough.

As stated above, the split mold part is composed of an outer wall shown in Fig. 3 and an inner wall shown in Fig. 4, each of which is vertically split into equal halves (it is sometimes advantageous for the outer wall to be laterally split into two halves). The split halves are connected by hinges so as to swing open and close easily.

The outer wall chiefly functions for shape retention of the inner wall against inner pressure. As shown in Fig. 3, several or several tens of drainage channels 19 are engraved on the inner side of the outer wall. At the bottom, the channels 19 are centered and led to a drainage hole 12 which is connected to a drainage pipe having a valve or a cock at the end. The number, width, depth, etc. of the drainage channels 19 are decided according to the size of the mold, the stock injection pressure, the amount of the stock injected, the mesh of the net through which water is squeezed, and the like.

The joint between the two halves of the split mold and the joint between the mold part

and the lid part should be designed to be easily clamped to make the cavity airtight.

The outer wall of the split mold is fixed by a clamping device 22 (Fig. 1) which withstands the pressure from the inside.

The inner wall of the split mold corresponds to a net used in a general paper machine. As shown in Fig. 4, it is made of a double-layered metal net and shaped in conformity to the inner contour of the outer wall. It is split into halves similarly to the outer wall. An inner net 20 of the double-layered metal net is a papermaking net, while the outer metal net 21, which is in contact with the outer wall, is a rigid and coarse net, serving to retain the shape of the papermaking net (inner net 20).

While the material of the papermaking net is not limited to metal, it is considered that other materials having a special finish, filter cloth, etc. fail to satisfy the conditions required for practical use or for construction. The thickness of the wire and the mesh of the outer and inner nets are decided depending on the size, kind, wall thickness, etc. of a desired paper product. Generally, an iron net of #16x24 and an iron or brass net of 60 to 80 are used as the outer and inner nets, respectively.

The lid part is fixed, and the closed split mold part is vertically moved by means of a cam, etc. to be clamped with the lid part. A spring for easy adjustment in the upward or downward movement is provided, which also serves as a safety means in pressure application.

The automatic metering feeder 3 is to control the thickness of the paper layer to be formed and to improve the efficiency in metering stock B. Further, when injection of stock B comes to an end, the metering feeder blows the stock (the time when compressed air is ejected from the drainage hole 12 can be an indication of the blowing) so that the stock is prevented from remaining in the bottom of the mold.

**Embodiment of the Invention:**

The mold part which is separated from the lid part is filled with previously prepared stock A, with the cock of the drainage hole being closed. On completion of the filling, the split mold is lifted by a cam or a jack and joined to the lid part. Then the air relief cock of the lid part and the stock B feed cock 16 (which is synchronized with the cock 17 for feeding compressed air to the metering feeder) of the lid part are opened, and the air in the buffer chamber is displaced with stock B, being discharged from the air outlet 14. This operation is the most important and needs particular care. Should the displacement be insufficient, the flow

pressure equalizing effect of the tray 15 and the effect of the buffer chamber 11 cannot be exerted to the full, resulting in a scraping or beating phenomenon by the liquid movement (friction), which leads to a failure to form a uniform paper layer. This being the case, the present invention cannot be carried out.

Immediately after the completion of the displacement (stock B begins to overflow from the air outlet 14), the air relief cock is closed, and at the same time the drainage cock below the drainage hole 12 is opened, whereupon a predetermined amount of stock B of the metering feeder is instantaneously fed from the buffer chamber 11 into the mold, and the water content of the stock passes through the inner net (papermaking net), flows down along the drainage channels of the outer wall and withdrawn from the drainage hole 12. Papermaking under pressure is thus carried out.

On completion of papermaking, the compressed air used for stock injection is ejected from the drainage hole. At this time point, the cock 17 for introducing compressed air is closed. At the same time, the stock B feed cock 16 is also closed. On closure of the cock 16, an auto-valve is opened to let another portion of stock B flows from the stock tank 2 into the metering feeder 3. This operation is repeated during operation.

Meanwhile the fibers in the stock form a uniform paper layer on the inner side of the inner wall to make a hollow wet paper preform.

The cock 10 (Fig. 1) of the pressure application and dewatering device is then opened to feed air (or liquid) into the diaphragm 9 in the cavity of the mold thereby to apply inner pressure of several atmospheres on the inner side of the paper layer. Thus, the paper layer is pressed, being sandwiched between the inflated diaphragm and the mold, to squeeze out water. This operation is another important feature of the present invention in addition to the above-described pressure papermaking.

After dewatering, the three-way cock 10 is turned so as to release the inner pressure of the diaphragm, the mold part is put down, the outer wall is opened, and the inner wall having the wet preform on the inner side thereof is taken out as such. In order to secure shape retention, the wet preform as being attached to the inner wall is transferred to a drier without opening the inner wall. Drying is preferably carried out in two stages - rough drying and perfect drying. In this case, as the hollow wet preform dries, it slightly shrinks and spontaneously separates from the inner net of the inner wall. As a result, the inner wall can easily be removed before the preform dries completely. Thereafter, the half-dried preform is

dried perfectly. In this manner, the drying effects are improved.

The inner wall is returned to the step of pressure papermaking and repeatedly used.

The paper containers and other fiber molded articles obtained by repeating the above-described series of operations may be subjected to a finishing or processing step according to the purpose into final products.

The effects, characteristics, and advantages of the present invention are as follows.

1. The state-of-the-art paper containers are generally fabricated articles called cartons whose shapes and uses are limited. Further, a great waste of paper that unavoidably accompanies the fabrication and repetition of steps involved are to be reflected on the product price. The process according to the present invention provides with ease narrow-mouthed hollow containers having a uniform wall thickness, which have not been obtained through a single step of molding but by using plastic materials such as glass and synthetic resins, and paper containers of arbitrary shape which have never been obtained by the conventional paper product production processes.

It seems that production of such paper products by papermaking with a mold has been studied in the art for years. However, it has been infeasible and extremely difficult to materialize this idea, while seemingly appearing easy.

The present invention has settled all the above problems and demands by a papermaking technique using a mold. In addition, considering the problem that our pulp resources are very limited, achievement of the object by reusing waste paper of low utility offers a meaningful solution to the problem.

2. Unlike a general papermaking technique which is usually carried out under atmospheric pressure, the present invention adopts forced papermaking under pressure, which will make high-speed and large-volume production feasible. Having no joint seams, the paper products of the present invention have increased strength.

When applied to a large-volume production system, the process of the invention does not require a huge plant. Molded articles of different shapes can be produced in the same plant simply by exchanging the split molds.

3. By the process of the present invention, not only conventional paper containers commonly demanded but a variety of other paper products can be produced at low cost, including cushioning materials for special vacuum tubes, glass-made instruments, precise parts, etc.; packaging or wrapping materials for shape retention; toys, bottles and cups having various

shapes; and the like.

As described above, the present invention remarkably broadens the application and use of paper products, which will make a great contribution to the related industries and the society.

**Claims:**

1. A split mold paper machine mainly comprising a split mold part comprising an outer wall 5 having prescribed drainage channels 19 on the inner side thereof and a split net 6 having a papermaking net 20, the split net being in contact with the inner side of the outer wall 5, a lid part having a buffer chamber 11 containing a buffer device 15, and a pressure application and dewatering device 8, 9 and 10 having a stretchable diaphragm 9.

2. A process for producing paper products such as containers and other fibrous molded articles, which comprises injecting under pressure paper stock prepared by beating fibers such as pulp or waste paper into a mold 5 through a buffer device 15, and feeding under pressure a fluid into a diaphragm 9 of the pressure application and dewatering device 8, 9 and 10 to squeeze out water and to form a paper layer in conformity to the mold.

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特許出願公告

# 特　許　公　報

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## 紙函器類の抄造による製造法

### 図面の略解

図面中第1図は全体を組立てた装置構成図、第2図a, b, cは割型抄紙機蓋部縦断正面図、縦断側面図及び平面図、第3図a, b, cは割型抄紙機割型部外殻縦断面、底部平面図及び横断面図、第4図a, b, cは割型抄紙機割型部内殻縦断面、横断面及び平面図。

### 発明の詳細なる説明

従来の各種紙製容器並に成型紙面は通常1度製品化された厚紙等を適当に裁断して成型機にかけ夫々の形態に造型されているが本発明は当初から抄造成型するものである。

従つて前者の場合多量の屑紙（ロス）を生じ且又部分成型後接着、接合等をも要し量産に於ても可成の工数を必要とし価格も割高を免れない。加之、従来の方法では屈曲多岐に亙り比較的形状の複雑なものに就ては、その生産は殆んど不可能に近い、反面これに期待を寄せる需要のむきは日常生活の進化に伴い、又は多角的な生産躍進と併行して軽易な各種消耗容器や安価で堅牢な梱包、包装材料として累増の一途を辿り、今や生産補助部門的重要な役割を課せられている現状であつて本発明のもつ使命は極めて大きいといえる。

発明の構成及び作用

本発明は製紙及び紙加工業に属し述上の要求を完全に充足するに足るもので任意形状の紙函類をパルプ又は故紙叩解から一挙に或は必要によりサイズイング、填充料添加、染色、精選工程を経た全紙料（抄造のため準備せられた所要濃度の紙料をいう）を用いこれを生産せんとする任意形状の割型抄紙機に導き加圧強制抄造を行い、乾燥、仕上、加工、工程を経て製品化するものである。即ち各工程を大別すると次の3工程に区分される。

（1）　叩解から精選工程を経た全紙料の調整（前処理）
（2）　割型抄紙機に加圧注入し抄造成型（発明工程）
（3）　乾燥、仕上、加工工程（後処理）

(1)項の紙料調整は一般製紙法のそれと大差ないがこの場合全紙料を比較的濃厚な紙料Aと稀釈された紙料Bと2区分して先ず前者を次いで後者を割型抄紙機に加圧注入することが望ましい。而して夫々の濃度は生産される紙面の模様により必ずしも一定でないが通常紙料Aを15～20％、紙料Bを3～5％とする。尚紙料を2区分しているのは予め高濃度紙料で構成した粗紙層を同一工程に於て稀釈紙料で均等に補正せしめ又加圧抄造を行うのは成型抄造が不可能であるばかりでなく次の様な特徴なり、目的によるものである。

（イ）　全紙料の型入後繊維の集束、沈降現象を未然に防ぎ均等紙層成型のため急速処理を必要とする。
（ロ）　紙函類は一般に肉厚紙層である。従つて抄造に際し逐次離水抵抗増大し且抄造速度の遅滞排除のため。
（ハ）　加圧すること、即ち強制抄造し繊維の配列を努めて不規則たらしめ製品の強度増大を計る。

本発明の主要機器構成は主機が割型抄紙機第1図4～5で附属装置として自動計量器第1図—3加圧装置第1図—7叩解装置、全紙料槽第1図1—2乾燥、加工装置等を附す。

割型抄紙機は割型部第1図5—6及び蓋部第2図から成り、割型は更に外殻第3図及びこれに内接する内殻第4図から構成せられる。

蓋部は稍々長円筒型で頂部を半球形若くは円垂形とし内部を流圧及び流速緩衝室第2図—11たらしむ、頂部に計量器に直結するB紙料注入孔第2図—13及び隣接する排気孔第2図—14を設け夫々外部にパイプ接続しバルブ又はコックを附す、注入孔の直下部に流速圧緩衝装置第2図—15を附し液中に於て流速、流圧の均分化を計る。

この緩衝装置及び蓋の頭部型状は本発明実施上大切な役割を果すものでその作用は計量器より注入される紙料が加圧されているためその注圧は加速度的に増大しこれがため常に流れの定跡を形成せんとする性状を緩急の度に応じ常時不定跡ならしむるもので即ち注圧強大の場合は半球形の頭部内面に反射衝突しその反射角度は圧力に比例して中心集中反射運動となり流速、流圧の均分化を計るのである。

尚この作用をより効果的にするため液中に於て行うときは気中に於て生じる滴下（叩き）現象を緩消せしめその他微妙な諸要素を包含しているものと見られる。

緩衝装置は諸種の形態のものが考えられるが最も簡単で充分な効果を発揮するのは小さな受皿である。このものの形状なり大いさ、或は注入孔との間隔等は注入する紙料の濃度、注入孔の大いさ、流圧等により決定されなければならない。別の形態例えばスパイラル粉霧装置を採用の場合に於ても目的に合致させる為には夫々の条件を斟酌して決定しなければならないし、精工に過ぎる欠点をも考慮する必要が生じる。

尚下部に緩衝室を貫通し垂直に割型部に至る内加圧、排水装置のパイプ第2図—8を有す。

本装置は加圧抄造後割型内で流体により内圧を加え湿紙を型壁との間で圧搾し水分を排出するものでパイプの最下端を閉塞し途中に数個の小孔を穿ちこれに伸縮性あるか委縮性ある強靱な隔膜第2図—9をパイプ下部及び型上部附近で被覆結束せしむ、又操作中緩衝室と割型部を遮断のためこのパイプへその接合部位附近に主軸を有する双半円型自動開閉隔壁板第2図—18を附す。排水操作終了時加圧を停止し内圧を排除するため加圧装置に接続するパイプの途中に三方コック第2図—10を取付ける。

この内加圧搾水装置は本蓋部から切放し別装置として操作することを有利とする場合は自動開閉隔壁板はパイプを有する栗締蓋で代替せられることとなる。

前述の様に割型部に外殻第3図及びこれに内接する内殻第4図から成り通常夫々中央から従裂2個に分離成型せられ（時として外殻は横裂2分を有利とすることあり）一方の個を蝶番対方に栗締装置を附し開閉の自由及び固定を容易たらしむ。

外殻は内殻の耐圧成型維持を主目的としその内面には数条或は数十条の排水溝第3図—19を刻みこれを下部中央附近に集約し集約排水孔第3図—12に至らしめこれには更に外部誘導管を附しその末端にバルブ又はコックを接続する。尚この排水溝の条数、幅、及び深さ等は型の大いさ、注液圧、注液量濾網のメッシュ等により決定される。

割型の接合部及び型部と蓋部の接合部は栗締を容易たらしむる為と気密にするための工作を必要とする。

割型外殻は操作中加圧に耐え得る圧締装置第1図—22を以て固定する。

内殻は一般製紙の濾網部に相当し二重金網製で外殻に内接する形状に外殻同様割型状に成型せられた相切半のものを以て1組とする。二重金網の内方網第4図—20は所謂濾網で外方網第4図—21即ち外殻内面に接する金網は強心粗網で濾網の保型維持を目的とする。

濾網は必ずしも金網と限定しないが特殊加工した他の資材や、フキルタークロース等にては利害の差大きく使用上或は構成上満足すべき条件を具備し難いと考えられる。外方網及び内方網の心線の大いさ、メッシニは製作さるべき製品の大きさ、種類、紙層の厚さ等により決定するも通常前者を鉄網#16×24目、後者を60—80目の鉄又は真鍮網とする。

斯くして蓋部は固定し、内、外殻構成を終えた型部はカム装置等により上、下運動せしめ蓋部に圧締接合（連結）する。而してこれ等何れの場合に於ても加減容易なバネ装置を附し加圧時に於ける安全装置をも兼用するものとする。

附属装置の自動計量器は紙層の肉厚調製と計量速度の能率化を計り或はB紙料注入終末に於てこれを吹切り（排水孔に圧縮空気噴出するに至れば吹切つた事が判る）割型底部に紙料（水面）を残留せしめないのを目的として附加するものである。

実施の態様（使用法）

予め準備せられた全紙料Aを常時上、下に分離している割型抄紙機の下方集約排水孔のコックを閉塞の状態に於て型部内に充填する。

充填終ればカム又はジヤツキ装置で割型を上方に押上げ蓋部は接合せしむ、次いで蓋部の排気コック及び紙料B注入コック第1図—16（計量器内加圧用圧縮空気開閉コック第1図—17と連動）を除ろに開き緩衝室内の空気を排気孔より脱気し紙料Bと置換する。

本操作は最も重要で万一置換しないか不充分の場合は受皿の流圧均分効果並に緩衝室の効果を充分に発揮することが出来ず液体運動（層振）による切削（スクレープ）或は叩き（滴下）現象を生じ均等に中空紙層を形成することが出来ない。従つて本発明の実施は不能となるから特に注意を要する。

置換が終りB紙料排気孔第2図—14より溢出するに至れば素早く排気コックを閉じると同時に割型下部の排水コック第3図—12を開放する。

然るときは計量器内所要量のB紙料は瞬時にして緩衝室第2図—11から型部内に至り水分は内殻（濾網）を通し外殻排水溝から集約排水孔を経て型外に流出し加圧強制抄造が行われる。

抄造の終末に至れば排水孔より注液に用いた圧縮空気が噴出するがこの時期に圧縮空気注気コックを閉じる（同時に紙料コックも閉されることとなる。閉ざすと紙料Bは再度オートバルブが開き紙料槽より計量器に自然流入する。この操作は作業中常時反覆される）。

然るとき紙料中の繊維は内殻内面に均等の紙層を中空形成し湿紙函の構成を終る。

次いで内加圧搾水装置のコック第1図—10を開き型内部に垂下する隔膜内に送気（液）して数気圧の内圧をかけ紙層を型壁と夾圧圧搾して遊離水分を圧出する。この操作は加圧抄造と併せ本発明の重要なる特徴の一つである。

以上の操作が終れば三方コックを排気の位置に転じ隔膜内の圧力を抜き型部を下方に下げ外殻を割り湿紙附着のまま内殻を外殻外に取出す。内殻は湿紙安全保型のため直ちに割ることなくそのまま乾燥装置に送り乾燥するのであるがこの場合は粗乾燥と完全乾燥の2工程制とすることが望ましい。即ち内殻内面に中空成型せられた紙層は乾燥度の進捗に伴い若干収縮するを以て内殻内面濾網との離型が自然に行われ完全乾燥を待たず内殻の回収を早め且離脱容易となるのみならず完全乾燥は半湿紙函のみで行われるを以て乾燥効果を増大する。

離型後この内殻は加圧抄造工程に返され反覆使用されるのである。

以上の操作を反覆して生産された紙函、紙器その他繊維塑造物はその目的に応じ仕上、加工工程を経て製品化されるのである。

本発明の効果、特徴利点は次の如くである。

1　現在の紙函、紙器類は通常所謂カルトンの2次加工品で、その形状には自ら限度があり又その用途も制限せられ而もこれにより所謂として切除せられる量は夥しく加工による重復工数と併せ製品価格に及ぼす負荷は看過出来ないし尚従来硝子、合成樹脂等の様に可塑性の物質でなければ1工程成型が出来なかつた紙層質均等な細口中空容器や現在の紙函、紙器製造方法では到底真似の出来ない自由形状のものが容易に生産される。

もとよりこれ等の諸懸案は初めより抄造成型により解決すべく多年識者間に於て考究された模様であるが、その方法は簡単の様で容易に現実性に乏しく至難事として今日に至つている。

本発明は前述の諸べてを抄造成型方法によつて解決したもので、又特にパルプ資源の少い我が国で再生利用度の低い雑故紙類の再使用に於て目的の達成が可能な事は国策上からも重要な問題解決の要素となつている。

2　本発明は一般の製紙が通常、常圧で抄造されているのに反し加圧強制抄造で従つて高速量産が可能であり、その特徴として繊目皆無は堅牢度を増大している。

量産に於ても莫大な設備を要せず又異型のものを造る場合に於ても割型の交換のみで平易に生産転換が出来る。

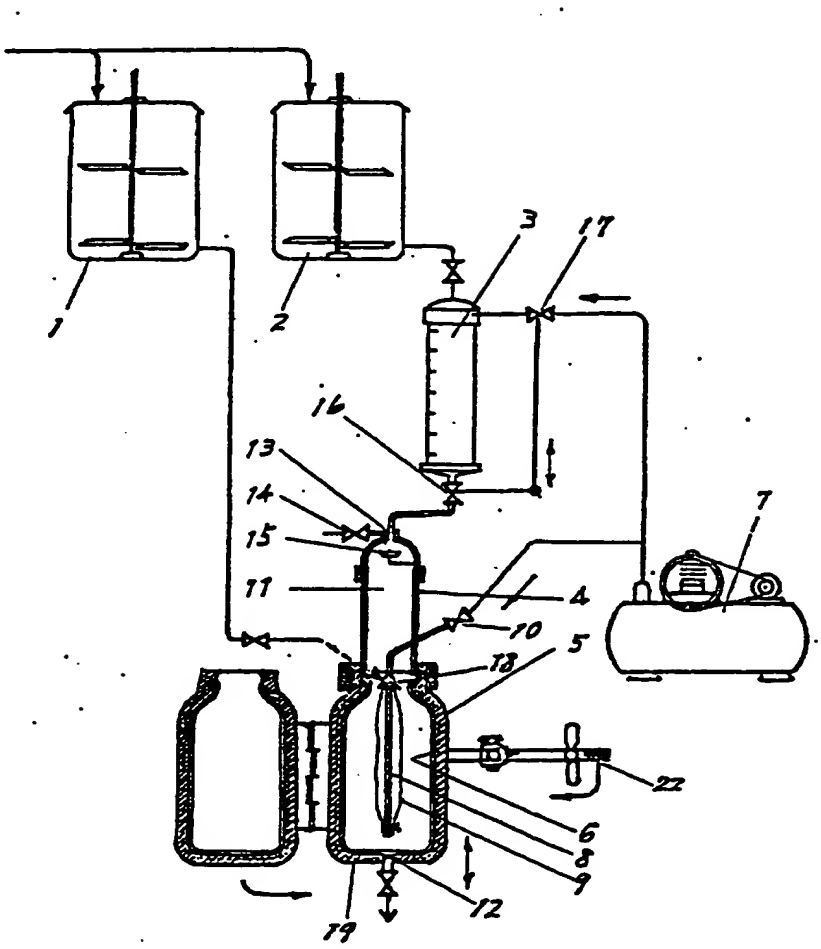
3　用途として従来の一般需要のものを含み特殊な真空管、ガラス製計器、精密機械部品等の緩衝用、或は保型用梱包、包装材及び形状多岐に亘る玩具、紙製瓶、カップ類等の低廉生産が可能である。

以上の様に本発明によつてその用途及び利用範囲は著しく拡大され斯業界に対する啓蒙及び社会的貢献は至大なるものと思料される。

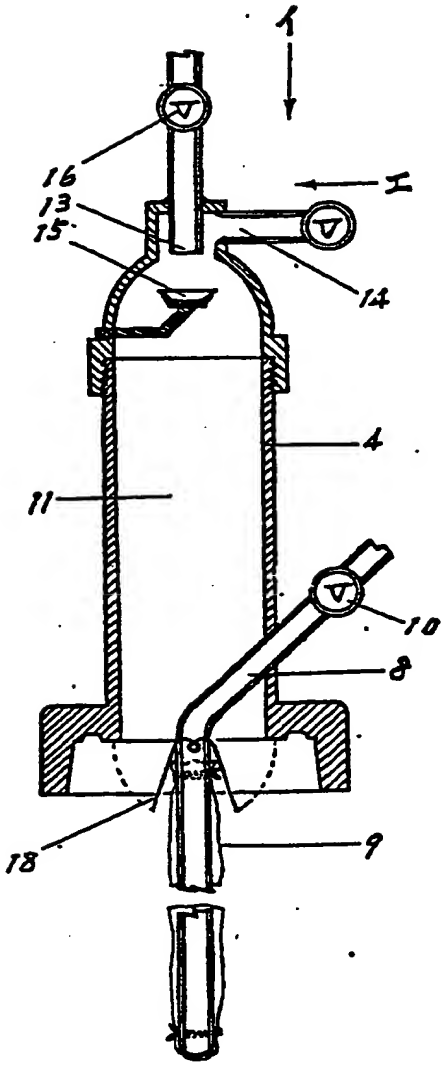
## 特許請求の範囲

図面に示す通り型部外殻5は内面に所要の排水溝19を有しこれに内接する濾網20は割型網製6とし、蓋部緩衝室11には緩衝装置15及び伸縮又は委縮性ある隔膜9を装着した内加圧搾水装置8—10を以て主たる構成とする割型抄紙機及び緩衝装置15を介して、パルプ、故紙其の他各種繊維を叩解した全紙料を型部5内に加圧注入して成型抄造し、更に内加圧搾水装置8—10の隔膜9内に流体を加圧送入し搾水、整型して各種紙函、紙器その他繊維塑造物を製造することを特徴とする紙函器類の抄造による製造法。

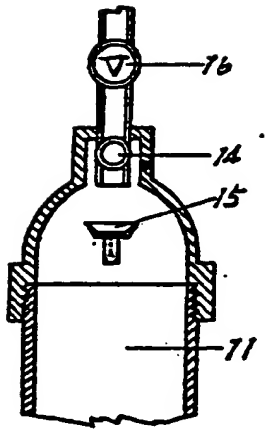
第1図



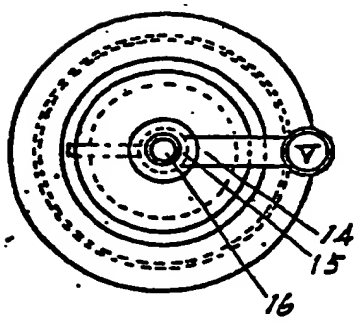
第2図 a



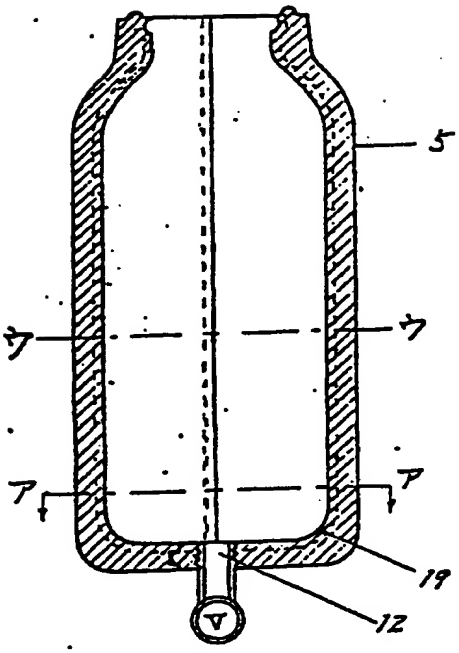

第2図 b



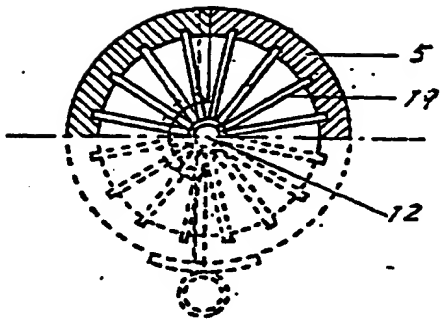

第2図 C



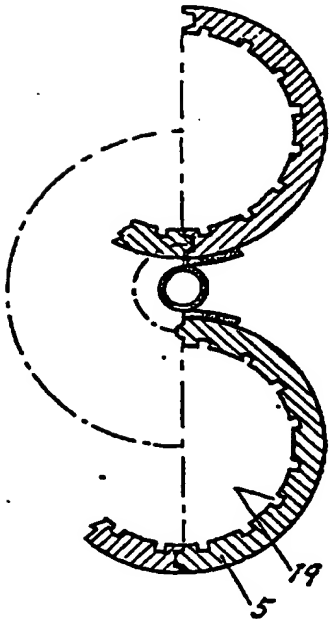
第3図 a



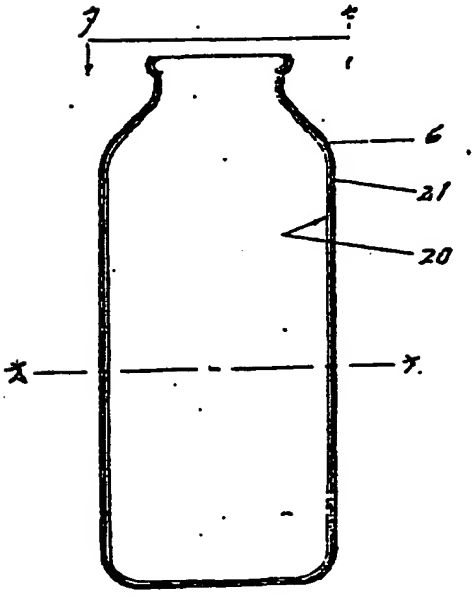

第3図 b



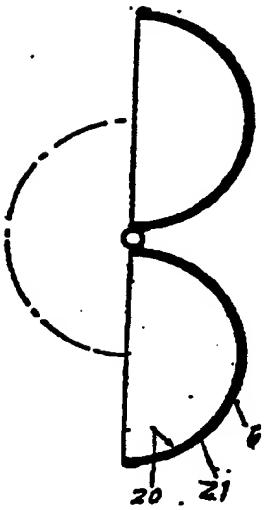

第3図 C




第4図 a



第4図 b




第4図 C